EDP-CM-LPC1768 Command Module
User Manual

Version 2.03

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1. Introduction

The RS-EDP platform is a system, has been designed to utilise many different manufacturers' microprocessors. To support NXP range or ARM/Cortex MCU's a single Command Module (CM) has been designed to accommodate four different device types. These are LPC2368 (ARM7), LPC1768 (Cortex M3), LPC1343 (Cortex M3) and LPC1113 (Cortex M0).

Each of the boards come with its own suite of software to fully exercise the RS-EDP Application Modules and the peripherals available on the MCU device.

In an RS-EDP system there is usually one Command Module (CM) and one or more Applications Modules (AM) plugged in to the Base Board (BB). These NXP modules have been designed as the Command Module for the system.

The 'Command Module' in a system dictates whether the whole system is a 3.3V one or a 5.0V one. All of these modules use a 3.3V microprocessor and consequently the I/O is mostly 3.3V also.
To tell the rest of the system the Command Module is a 3.3V one not a 5.0V one, the Vcc_CM line on the base board is connected to 3.3V by the tracking on the Command Module board. This Vcc_CM is used as a reference by the other modules, such as the analogue module, to limit the output voltage to 3.3V. The command voltage line is also used by the #RESET circuit, as the voltage reference to pull up to after the reset line has been asserted low.

The RS-EDP-CM-NXP module maps the I/O of the MCU on the board to the backplane of the RS-EDP system. As there are quite a few dual function pins on the NXP processors and hence several link options have been made to accommodate the various options the user may wish to use. Extensive use of the I2C capability is used to communicate to the application modules in the system.

2. MCU Mapping

2.1 MCU Pin Allocation

The MCU pins have been connected to the backplane via the following configuration.

LPC1768BDM100		**Comment**	**RS-EDP-BASE BOARD - mapping**
Pin	**Name**		Name
1	TDO/SWO	JTAG interface on LPC module	
2	TDI	JTAG interface on LPC module	
3	TMS/SWDIO	JTAG interface on LPC module	
4	#TRST	JTAG interface on LPC module	
5	TCK/SWDCLK	JTAG interface on LPC module	
6	P0[26]/AD0[3]/AOUT/RXD3	3 link options	AN3
		3 link options	AN11
		3 link options	CPU_DACO0_GPIO17
7	P0[25]/AD0[2]/I2SRX_SDA/TXD3	2 link options	AN2
		2 link options	AN10
8	P0[24]/AD0[1]/I2SRX_WS/CAP3[1]	2 link options	AN1
		2 link options	AN9
9	P0[23]/AD0[0]/I2SRX_CLK/CAP3[0]	2 link options	AN0
		2 link options	AN8
10	Vdda	2 link options	AN_REF
		2 link options	Vcc_CM
11	Vssa		VAGND
		Jumper option to SGND	SGND
12	VREFP	2 link options	AN_REF
		2 link options	Vcc_CM
13	NC		3.3V

14	#RSTOUT		#RESOUT
15	VREFN		VAGND
		Jumper option to SGND	SGND
16	RTCX1	32KHz clock on LPC module	
17	#RESET		#RESIN
18	STCX2	32KHz clock on LPC module	
19	VBAT	2 link options	3V BAT
		2 link options	3.3V
20	P1[31]/SCK1/AD0[5]	2 link options	AN5
		2 link options	AN13
21	P1[30]/Vbus/AD0[4]	2 link options	AN4
		2 link options	AN12
22	XTAL1	Xtal on module	
23	XTAL2	Xtal on module	
24	P0[28]/SCL0/USB_SCL		CNTRL_I2C_SCL
25	P0[27]/SDA0/USB_SDA		CNTRL_I2C_SDA
26	P3[26]/STCLK/MAT0[1]/PWM1[3]		EVG1_GPIO42
27	P3[25]/MAT0[0]/PWM1[2]	2 link options	EVG0_GPIO40
		2 Link options - User LED1	
28	Vdd(3V3)		3.3V
29	P0[29]/USB_D+		USB_DEV_D+
30	P0[30]/USB_D-		USB_DEV_D-
31	Vss		SGND
32	P1[18]/USB_UP_LED/PWM1[1]/CAP1[0]	3 link options	EVG5_GPIO50
		3 link options	EVG8_GPIO56
		3 link options	EVG0_GPIO40
33	P1[19]/MC0A/USB_PPWR/CAP1[1]	2 link options	MOTORP0H
		2 link options	EVG9_GPIO57
34	P1[20]/MCFB0/PWM1[2]/SCK0	2 link options	MOTORH0_ENC0
		2 link options	EVG10_GPIO58
35	P1[21]/MCABORT/PWM1[3]/SSEL0	2 link options	EMG_TRAP
		2 link options	EVG11_GPIO59
36	P1[22]/MC0B/USB_PWRD/MAT1[0]	2 link options	MOTORP0L
		2 link options	EVG12_GPIO60
37	P1[23]/MCFB1/PWM1[4]/MISO0	2 link options	MOTORH1_ENC1
		2 link options	EVG13_GPIO61
38	P1[24]/MCFB2/PWM1[5]/MOSI0	2 link options	MOTORH2_ENC2
		2 link options	EVG14_GPIO62
39	P1[25]/MC1A/MAT1[1]	2 link options	MOTORP1H
		2 link options	EVG15_GPIO63
40	P1[26]/MC1B/PWM1[6]/CAP0[0]	2 link options	MOTORP1L
		2 link options	EVG16_GPIO64
41	Vss		SGND
42	Vdd(reg)(3V3)		3.3V
43	P1[27]/CLKOUT/USB_OVRCR/CAP0[1]		EVM5_GPIO47
44	P1[28]/MC2A/PCAP1[0]/MAT0[0]	2 link options	MOTORP2H
		2 link options	EVG17_GPIO65
45	P1[29]/MC2B/PCAP1[1]/MAT0[1]	2 link options	MOTORP2L
		2 link options	EVG18_GPIO66
46	P0[0]/RD1/TXD3/SDA1	3 link options	CAN0_TX
		3 link options	CAN0_TX_LOCAL
		3 link options	I2C_GEN0_SDA
47	P0[1]/TD1/RXD3/SCL1	3 link options	CAN0_RX
		3 link options	CAN0_RX_LOCAL
		3 link options	I2C_GEN0_SCL
48	P0[10]/TXD2/SDA2/MAT3[0]	2 link options	GPIO0
		2 link options	EVG6_GPIO52
49	P0[11]/RXD2/SCL2/MAT3[1]	2 link options	GPIO1
		2 link options	EVG7_GPIO54

50	P2[13]/#EINT3/I2STX_SDA		GPIO8_MCI_DAT3
51	P2[12]/#EINT2/I2STX_WS		GPIO6_MCI_DAT2
52	P2[11]/#EINT1/I2STX_CLK		GPIO4_MCI_DAT1
53	P2[10]/#EINT0/NMI	2 link options	IRQ_GPIO16_CNTRL_I2C_INT
		2 link options	IRQ_GPIO18_I2C_GEN0_INT
54	Vdd(3V3)		3.3V
55	Vss		SGND
56	P0[22]/RTS1/TD1	2 link options	GPIO2_MCI_DAT0
		2 Link options	EVM6_GPIO49
57	P0[21]/RI1/RD1	2 link options	GPIO14_MCI_PWR
		2 Link options	EVM4_GPIO45
58	P0[20]/DTR1/SCL1	2 link options	GPIO12_MCI_CMD
		2 Link options	EVM3_GPIO43
59	P0[19]/DSR1/SDA1	2 link options	GPIO10_MCI_CLK
		2 Link options	EVM2_GPIO41_CAPADC
60	P0[18]/DCD1/MOSI0/MOSI		CNTRL_SPI_MTSR
61	P0[17]/CTS1/MISO0/MISO		CNTRL_SPI_MRST
62	P0[15]/TXD1/SCK0/SCK		CNTRL_SPI_CLK
63	P0[16]/RXD1/SSEL0/SSEL		CNTRL_SPI_#CS_NSS
64	P2[9]/USB_CONNECT/RXD2	2 link options	ASC1_RX_TTL
		2 link options	EVM10_GPIO68_ASCO_CTS
65	P2[8]/TD2/TXD2	2 link options	ASC1_TX_TTL
		2 link options	CAN1_TX
66	P2[7]/RD2/RTS1	2 link options	ASC1_TX_TTL_ASC0_DTR
		2 link options	CAN1_RX
67	P2[6]/PCAP1[0]/RI1/TRACECLK	2 link option	MOTOR_TCO_FB
		2 link options User LED0	
68	P2[5]/PWM1[6]/DTR1/TRACEDATA[0]	2 link option	EVG4_GPIO48
		2 link option	EVG19_GPIO67
69	P2[4]/PWM1[5]/DSR1/TRACEDATA[1]	2 link option	CPU_DAC01_GPIO19
		2 link option	EVG3_GPIO46
70	P2[3]/PWM1[4]/DCD1/TRACEDATA[2]	2 link option	CPU_DACO0_GPIO17
		2 link option	EVG2_GPIO44
71	Vdd(3V3)		3.3V
72	Vss		SGND
73	P2[2]/PWM1[3]/CTS1/TRACEDATA[3]		EVM9_GPIO55
74	P2[1]/PWM1[2]/RXD1	2 link options	ASC1_RX_TTL
		2 Link options	EVM8_GPIO53
75	P2[0]/PWM1[1]/TXD1	2 link options	ASC1_TX_TTL
		2 Link options	EVM7_GPIO51
76	P0[9]/I2STX_SDA/MOSI1/MAT2[3]	Local_SD_SPI_MOSI	
77	P0[8]/I2STX_WS/MISO1/MAT2[2]	Local_SD_SPI_MISO	
78	P0[7]/I2STX_CLK/SCK1/MAT2[1]	Local_SD_SPICLK	
79	P0[6]/I2SRX_SDA/SSEL1/MAT2[0]	Local_SD_CS_SD	
80	P0[5]/I2SRX_WS/TD2/CAP2[1]	3 link options	GPIO9_I2S_RX_WS
		3 link options	EVM1_GPIO23
		3 link options	CPU_DACO0_GPIO17
81	P0[4]/I2SRX_CLK/RD2/CAP2[0]	2 link option	GPIO7_I2S_RX_CLK
		2 Link options	EVM0_GPIO21
82	P4[28]/RX_MCLK/MAT2[0]/TXD3	USB Debug ports FTDI chip	
83	Vss		SGND
84	Vdd(reg)(3V3)		3.3V
85	P4[29]/TX_MCLK/MAT2[1]/RXD3	USB Debug ports FTDI chip	
86	P1[17]/ENET_MDIO	Ethernernet PHY chip	
87	P1[16]/ENET_MDC	Ethernernet PHY chip	
88	P1[15]/ENET_REF_CLK	Ethernernet PHY chip	
89	P1[14]/ENET_RX_ER	Ethernernet PHY chip	
90	P1[10]/ENET_RXD1	Ethernernet PHY chip	
91	P1[9]/ENET_RXD0	Ethernernet PHY chip	
92	P1[8]/ENET_CRS	Ethernernet PHY chip	
93	P1[4]/ENET_TX_EN	Ethernernet PHY chip	

94	P1[1]/ENET_TXD1	Ethernernet PHY chip	
95	P1[0]/ENET_TXD0	Ethernernet PHY chip	
96	Vdd(3V3)		3.3V
97	Vss		SGND
98	P0[2]/TXD0/AD0[7]	3 Link options	ASC0_TX_TTL
		3 link options	AN7
		3 link options	AN15
99	P0[3]/RXD0/AD0[6]	3 Link options	ASC0_RX_TTL
		3 link options	AN6
		3 link options	AN14
100	RTCK	JTAG interface on LPC module	

2.2 Resources Used/Available by the LPC1768

The following resources are available to be used by the MCU

Resources Used/Available
3.3V
3V BAT
Vcc_CM
AN_REF
VAGND
#RESIN
#RESOUT
SGND
VAGND
AN0
AN1
AN2
AN3
AN4
AN5
AN6
AN7
AN8
AN9
AN10
AN11
AN12
AN13
AN14
AN15
ASC0_RX_TTL
ASC0_TX_TTL
ASC1_RX_TTL
ASC1_TX_TTL
ASC1_TX_TTL_ASC0_DTR
CAN0_RX
CAN0_TX
CAN1_RX
CAN1_TX
CAN0H
CAN0L
CNTRL_I2C_SCL
CNTRL_I2C_SDA
CNTRL_SPI_#CS_NSS
CNTRL_SPI_CLK
CNTRL_SPI_MRST

CNTRL_SPI_MTSR
CPU_DACO0_GPIO17
CPU_DACO0_GPIO17
CPU_DACO1_GPIO19
EVG0_GPIO40
EVG1_GPIO42
EVG2_GPIO44
EVG3_GPIO46
EVG4_GPIO48
EVG5_GPIO50
EVG6_GPIO52
EVG7_GPIO54
EVG8_GPIO56
EVG9_GPIO57
EVG10_GPIO58
EVG11_GPIO59
EVG12_GPIO60
EVG13_GPIO61
EVG14_GPIO62
EVG15_GPIO63
EVG16_GPIO64
EVG17_GPIO65
EVG18_GPIO66
EVG19_GPIO67
EVM0_GPIO21
EVM1_GPIO23
EVM2_GPIO41_CAPADC
EVM3_GPIO43
EVM4_GPIO45
EVM5_GPIO47
EVM6_GPIO49
EVM7_GPIO51
EVM8_GPIO53
EVM9_GPIO55
EVM10_GPIO68_ASCO_CTS
GPIO0
GPIO1
GPIO7_I2S_RX_CLK
GPIO9_I2S_RX_WS
GPIO10_MCI_CLK
GPIO12_MCI_CMD
GPIO14_MCI_PWR
GPIO2_MCI_DAT0
GPIO4_MCI_DAT1
GPIO6_MCI_DAT2
GPIO8_MCI_DAT3
I2C_GEN0_SCL
I2C_GEN0_SDA
IRQ_GPIO16_CNTRL_I2C_INT
IRQ_GPIO18_I2C_GEN0_INT
MOTORP0H
MOTORP0L
MOTORP1H
MOTORP1L
MOTORP2H
MOTORP2L
MOTORH0_ENC0
MOTORH1_ENC1
MOTORH2_ENC2
EMG_TRAP
MOTOR_TCO_FB

USB_DEV_D-
USB_DEV_D+

2.3 Alphabetical Listing of MCU pins

Pin	Alphabetic Listing of Available I/O
17	#RESET
14	#RSTOUT
4	#TRST
13	NC
46	P0[0]/RD1/TXD3/SDA1
47	P0[1]/TD1/RXD3/SCL1
98	P0[2]/TXD0/AD0[7]
99	P0[3]/RXD0/AD0[6]
81	P0[4]/I2SRX_CLK/RD2/CAP2[0]
80	P0[5]/I2SRX_WS/TD2/CAP2[1]
79	P0[6]/I2SRX_SDA/SSEL1/MAT2[0]
78	P0[7]/I2STX_CLK/SCK1/MAT2[1]
77	P0[8]/I2STX_WS/MISO1/MAT2[2]
76	P0[9]/I2STX_SDA/MOSI1/MAT2[3]
48	P0[10]/TXD2/SDA2/MAT3[0]
49	P0[11]/RXD2/SCL2/MAT3[1]
62	P0[15]/TXD1/SCK0/SCK
63	P0[16]/RXD1/SSEL0/SSEL
61	P0[17]/CTS1/MISO0/MISO
60	P0[18]/DCD1/MOSI0/MOSI
59	P0[19]/DSR1/SDA1
58	P0[20]/DTR1/SCL1
57	P0[21]/RI1/RD1
56	P0[22]/RTS1/TD1
9	P0[23]/AD0[0]/I2SRX_CLK/CAP3[0]
8	P0[24]/AD0[1]/I2SRX_WS/CAP3[1]
7	P0[25]/AD0[2]/I2SRX_SDA/TXD3
6	P0[26]/AD0[3]/AOUT/RXD3
25	P0[27]/SDA0/USB_SDA
24	P0[28]/SCL0/USB_SCL
29	P0[29]/USB_D+
30	P0[30]/USB_D-
95	P1[0]/ENET_TXD0
94	P1[1]/ENET_TXD1
93	P1[4]/ENET_TX_EN
92	P1[8]/ENET_CRS
91	P1[9]/ENET_RXD0
90	P1[10]/ENET_RXD1
89	P1[14]/ENET_RX_ER
88	P1[15]/ENET_REF_CLK
87	P1[16]/ENET_MDC
86	P1[17]/ENET_MDIO
32	P1[18]/USB_UP_LED/PWM1[1]/CAP1[0]
33	P1[19]/MC0A/USB_PPWR/CAP1[1]
34	P1[20]/MCFB0/PWM1[2]/SCK0
35	P1[21]/MCABORT/PWM1[3]/SSEL0
36	P1[22]/MC0B/USB_PWRD/MAT1[0]
37	P1[23]/MCFB1/PWM1[4]/MISO0
38	P1[24]/MCFB2/PWM1[5]/MOSI0
39	P1[25]/MC1A/MAT1[1]
40	P1[26]/MC1B/PWM1[6]/CAP0[0]
43	P1[27]/CLKOUT/USB_OVRCR/CAP0[1]
44	P1[28]/MC2A/PCAP1[0]/MAT0[0]

45	P1[29]/MC2B/PCAP1[1]/MAT0[1]
21	P1[30]/Vbus/AD0[4]
20	P1[31]/SCK1/AD0[5]
75	P2[0]/PWM1[1]/TXD1
74	P2[1]/PWM1[2]/RXD1
73	P2[2]/PWM1[3]/CTS1/TRACEDATA[3]
70	P2[3]/PWM1[4]/DCD1/TRACEDATA[2]
69	P2[4]/PWM1[5]/DSR1/TRACEDATA[1]
68	P2[5]/PWM1[6]/DTR1/TRACEDATA[0]
67	P2[6]/PCAP1[0]/RI1/TRACECLK
66	P2[7]/RD2/RTS1
65	P2[8]/TD2/TXD2
64	P2[9]/USB_CONNECT/RXD2
53	P2[10]/#EINT0/NMI
52	P2[11]/#EINT1/I2STX_CLK
51	P2[12]/#EINT2/I2STX_WS
50	P2[13]/#EINT3/I2STX_SDA
27	P3[25]/MAT0[0]/PWM1[2]
26	P3[26]/STCLK/MAT0[1]/PWM1[3]
82	P4[28]/RX_MCLK/MAT2[0]/TXD3
85	P4[29]/TX_MCLK/MAT2[1]/RXD3
100	RTCK
16	RTCX1
18	STCX2
5	TCK/SWDCLK
2	TDI
1	TDO/SWO
3	TMS/SWDIO
19	VBAT
28	Vdd(3V3)
54	Vdd(3V3)
71	Vdd(3V3)
96	Vdd(3V3)
42	Vdd(reg)(3V3)
84	Vdd(reg)(3V3)
10	Vdda
15	VREFN
12	VREFP
31	Vss
41	Vss
55	Vss
72	Vss
83	Vss
97	Vss
11	Vssa
22	XTAL1
23	XTAL2

2.4 Backplane Signal Names and Connections

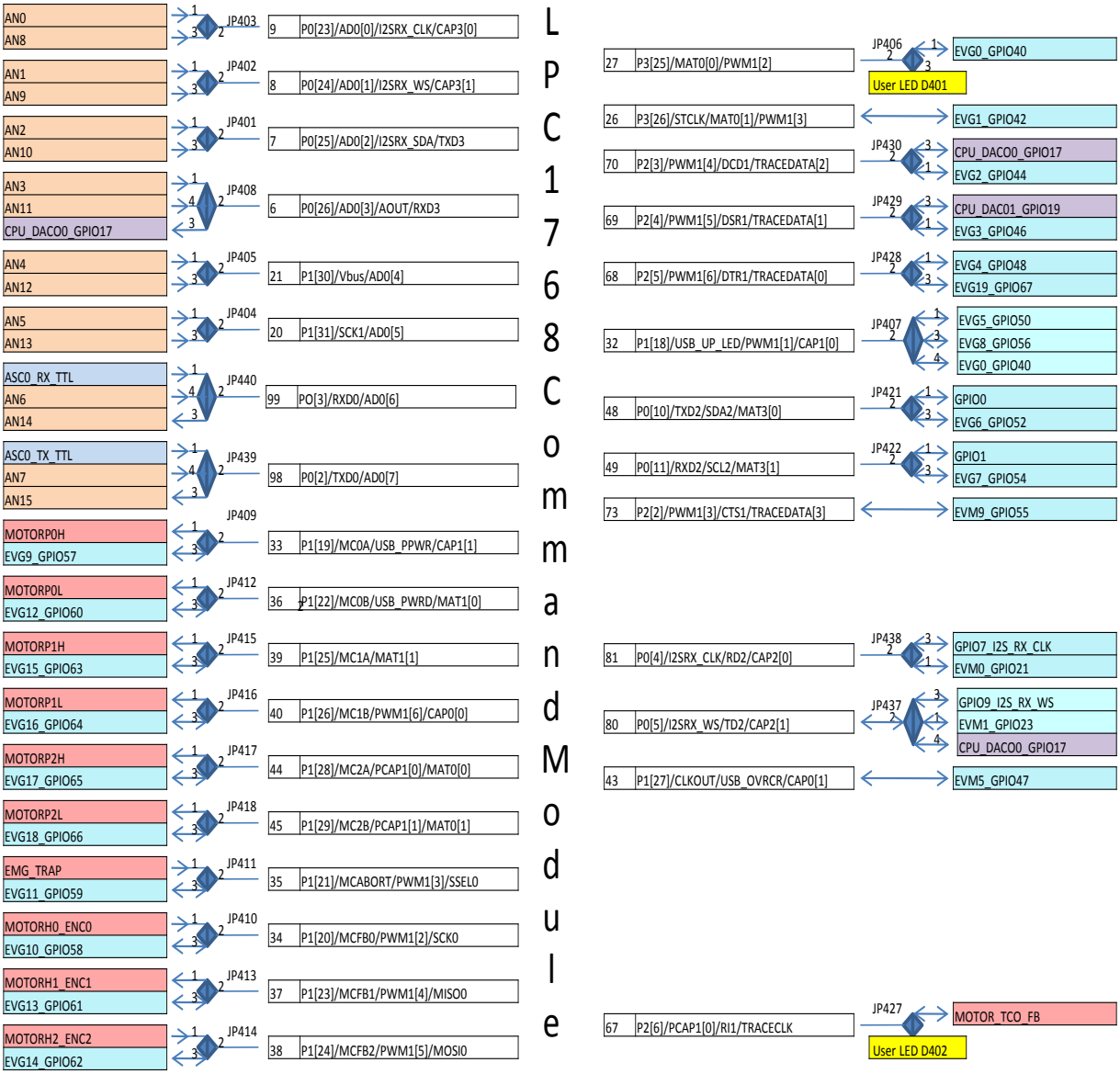
Base Board Signal Name	EDPCON1	EDPCON2	Break Out Connector	
#CS0		53 & 54		
#CS1		55 & 56		
#CS2		57 & 58		
#CS3		59 & 60		
#PSEN		51 & 52		
#RD		45 & 46		
#RESIN		1 & 2	P603	26
#RESOUT		3 & 4	P603	27

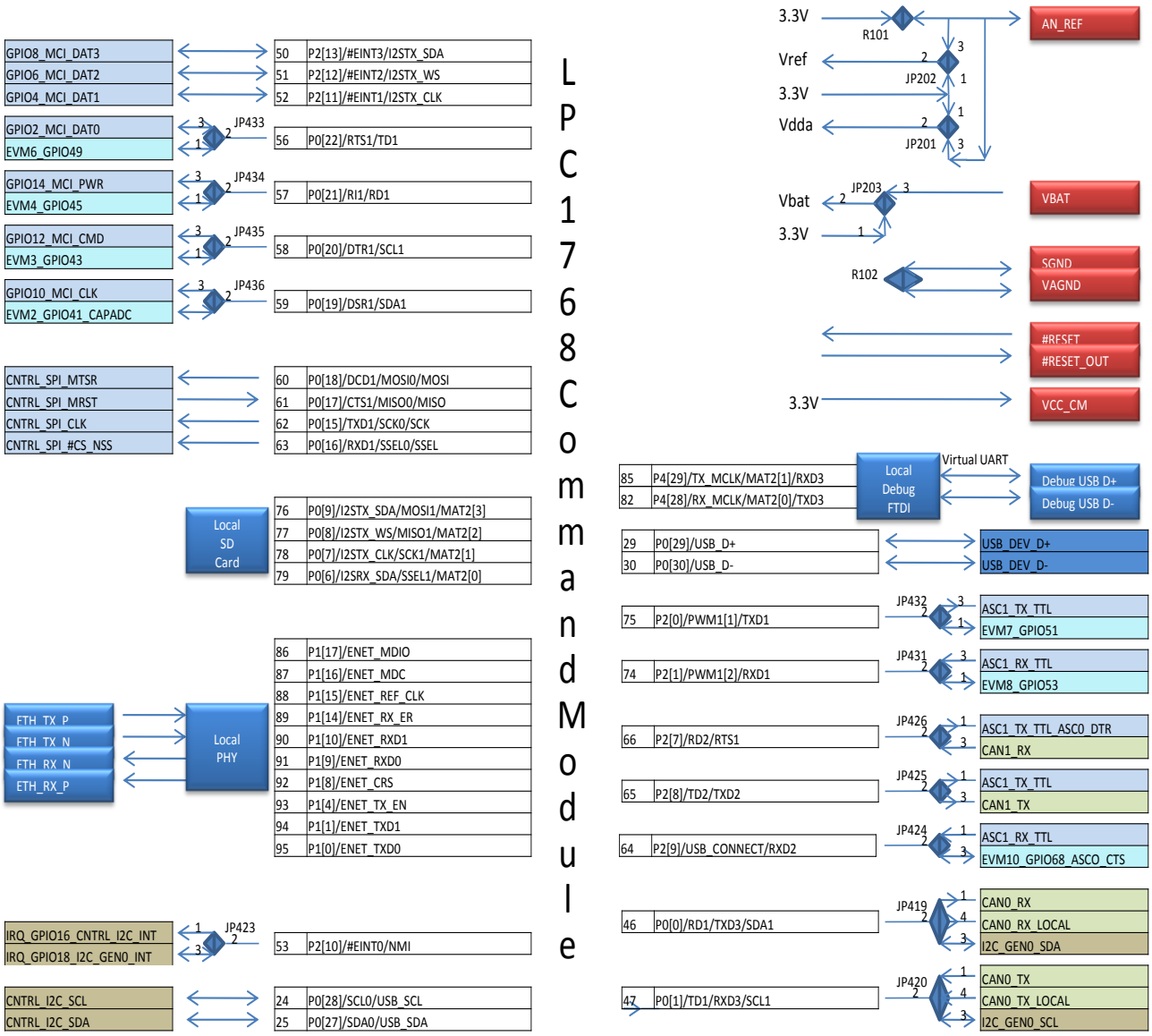
#WR		47 & 48		
#WRH		49 & 50		
12V	133		P603	47
12V	134		P603	47
12V	135		P603	47
12V	136		P603	47
12V GND	137		P603	48
12V GND	138		P603	48
12V GND	139		P603	48
12V GND	140		P603	48
3.3V	127		P603	44
3.3V	128		P603	44
3.3V		95 & 96	P603	44
3V BAT	124		P603	42
5.0V	129		P603	45
5.0V	130		P603	45
5.0V		97 & 98	P603	45
A0_AD0		41 & 42		
A1_AD1		39 & 40		
A2_AD2		37 & 38		
A3_AD3		35 & 36		
A4_AD4		33 & 34		
A5_AD5		31 & 32		
A6_AD6		29 & 30		
A7_AD7		27 & 28		
A8_AD8		25 & 26		
A9_AD9		23 & 24		
A10_AD10		21 & 22		
A11_AD11		19 & 20		
A12_AD12		17 & 18		
A13_AD13		15 & 16		
A14_AD14		13 & 14		
A15_AD15		11 & 12		
ALE		43 & 44		
AN_REF	1		P601	6
AN0	3		P603	2
AN1	4		P603	6
AN2	5		P603	1
AN3	6		P603	5
AN4	7		P602	2
AN5	8		P602	4
AN6	9		P602	1
AN7	10		P602	3
AN8	11		P601	2
AN9	12		P601	4
AN10	13		P601	1
AN11	14		P601	3
AN12	15		P603	4
AN13	16		P602	6
AN14	17		P603	3
AN15	18		P602	5
ASC0_RX_TTL	89		P602	30
ASC0_TX_TTL	91		P602	31
ASC1_RX_TTL	93		P602	32
ASC1_RX_TTL_ASC0_DSR	99		P602	35
ASC1_TX_TTL	95		P602	33
ASC1_TX_TTL_ASC0_DTR	97		P602	34
CAN0_RX		61 & 62		
CAN0_TX		63 &64		
CAN1_RX	121		P602	46
CAN1_TX	123		P602	47

CANH0		89 & 90	P603	40
CANL0		91 & 92	P603	41
CNTRL_I2C_SCL		79 & 80	P603	35
CNTRL_I2C_SDA		77 & 78	P603	34
CNTRL_SPI_#CS_NSS		75 & 76	P603	33
CNTRL_SPI_CLK		69 & 70	P603	30
CNTRL_SPI_MRST		71 & 72	P603	31
CNTRL_SPI_MTSR		73 & 74	P603	32
CPU_DAC01_GPIO19	40		P601	7
CPU_DACO0_GPIO17	38		P603	7
EMG_TRAP	114		P601	44
ETH_LNK_LED	111		P602	41
ETH_RX-	109		P602	40
ETH_RX_LED	113		P602	42
ETH_RX+	107		P602	39
ETH_SPD_LED	115		P602	43
ETH_TX-	105		P602	38
ETH_TX+	103		P602	37
EVG0_GPIO40	61		P602	16
EVG1_GPIO42	63		P602	17
EVG2_GPIO44	65		P602	18
EVG3_GPIO46	67		P602	19
EVG4_GPIO48	69		P602	20
EVG5_GPIO50	71		P602	21
EVG6_GPIO52	73		P602	22
EVG7_GPIO54	75		P602	23
EVG8_GPIO56	77		P602	24
EVG9_GPIO57	78		P601	26
EVG10_GPIO58	79		P602	25
EVG11_GPIO59	80		P601	27
EVG12_GPIO60	81		P602	26
EVG13_GPIO61	82		P601	28
EVG14_GPIO62	83		P602	27
EVG15_GPIO63	84		P601	29
EVG16_GPIO64	85		P602	28
EVG17_GPIO65	86		P601	30
EVG18_GPIO66	87		P602	29
EVG19_GPIO67	88		P601	31
EVG20_GPIO69_ASCO_RTS	92		P601	33
EVM0_GPIO21	42		P601	8
EVM1_GPIO23	44		P601	9
EVM2_GPIO41_CAPADC	62		P601	18
EVM3_GPIO43	64		P601	19
EVM4_GPIO45	66		P601	20
EVM5_GPIO47	68		P601	21
EVM6_GPIO49	70		P601	22
EVM7_GPIO51	72		P601	23
EVM8_GPIO53	74		P601	24
EVM9_GPIO55	76		P601	25
EVM10_GPIO68_ASCO_CTS	90		P601	32
GPIO0	21		P603	13
GPIO1	22		P603	15
GPIO2_MCI_DAT0	23		P603	14
GPIO3	24		P603	16
GPIO4_MCI_DAT1	25		P603	17
GPIO5_I2S_TX_WS	26		P603	19
GPIO6_MCI_DAT2	27		P603	18
GPIO7_I2S_RX_CLK	28		P603	20
GPIO8_MCI_DAT3	29		P603	22
GPIO9_I2S_RX_WS	30		P603	21
GPIO10_MCI_CLK	31		P603	23

GPIO11_I2S_RX_SDA	32		P603	24
GPIO12_MCI_CMD	33			
GPIO13_I2S_TX_CLK	34		P603	25
GPIO14_MCI_PWR	35		P603	12
GPIO15_I2S_TX_SDA	36		P603	8
GPIO24_AD7	45		P602	8
GPIO25_AD15	46		P601	10
GPIO26_AD6	47		P602	9
GPIO27_AD14	48		P601	11
GPIO28_AD5	49		P602	10
GPIO29_AD13	50		P601	12
GPIO30_AD4	51		P602	11
GPIO31_ADI2	52		P601	13
GPIO32_AD3	53		P602	12
GPIO33_AD11	54		P601	14
GPIO34_AD2	55		P602	13
GPIO35_AD10	56		P601	15
GPIO36_AD1	57		P602	14
GPIO37_AD9	58		P601	16
GPIO38_AD0	59		P602	15
GPIO39_AD8	60		P601	17
I2C_GEN0_SCL		7 & 8	P603	29
I2C_GEN0_SDA		5 & 6	P603	28
I2C_GEN1_SCL	119		P602	45
I2C_GEN1_SDA	117		P602	44
IRQ_GPIO16_CNTRL_I2C_INT	37		P603	11
IRQ_GPIO18_I2C_GEN0_INT	39		P603	10
IRQ_GPIO20_I2C_GEN1_INT	41		P603	9
IRQ_GPIO22_I2C_INT	43		P602	7
MOTOR_TCO_FB	122		P601	48
MOTORH0_ENC0	116		P601	45
MOTORH1_ENC1	118		P601	46
MOTORH2_ENC2	120		P601	47
MOTORP0H	102		P601	38
MOTORP0L	100		P601	37
MOTORP1H	106		P601	40
MOTORP1L	104		P601	39
MOTORP2H	110		P601	42
MOTORP2L	108		P601	41
MOTORPWM	112		P601	43
SGND	131		P603	46
SGND	132		P603	46
SGND		9 & 10	P603	46
SGND		99 & 100	P603	46
SPI_SSC_#CS_NSS	101		P602	36
SPI_SSC_CLK	98		P601	36
SPI_SSC_MRST_MISO	94		P601	34
SPI_SSC_MTSR_MOSI	96		P601	35
USB_DEBUG_D-		67 & 68		
USB_DEBUG_D+		65 & 66		
USB_DEV_D-		87 & 88	P603	39
USB_DEV_D+		85 & 86	P603	38
USB_HOST_D-		83 & 84	P603	37
USB_HOST_D+		81 & 82	P603	36
VAGND	19		P601	5
VAGND	20		P601	5
Vcc_CM	125		P603	43
Vcc_CM	126		P603	43
Vcc_CM		93 & 94	P603	43

2.5 Mapping Aids





3. Solder Link Options

Many of the options for the Command Module board require a solder bridge to be made or a track to be cut. The CM board has been designed to be configured in the most popular setting by using a small track between the options, which will require cutting with a sharp knife before making the alternate connection options.

The options we have are as follows:

VDDA

JP201 (1-2)	VDDA on the MCU is connected to 3.3V
JP201 (2-3)	VDDA on the MCU is connected to AN_REF on the backplane

Vref

JP202 (1-2)	VREF on the MCU is connected to 3.3V
JP202 (2-3)	VREF on the MCU is connected to AN_REF on the backplane

VBAT

JP203 (1-2)	VBAT on the MCU is connected to 3.3V
JP203 (2-3)	VREF on the MCU is connected to 3V3_BATT on the backplane

Port P0 Options

P0[0]/RD1/TXD3/SDA1

JP419 (2-1)	CAN0_TX
JP419 (2-4) (Default)	CAN0_TX_LOCAL
JP419 (2-3)	I2C_GEN0_SDA

Position 2-1 puts the CAN logic level transmit traffic on the backplane. A physical layer CAN transceiver on the Communications Module can translate this in to the CANH and CANL physical layer for networking. It is possible on the Communications Module to make this CAN isolated.
Position 2-4 routes the CAN logic level transmit traffic to a local physical layer CAN transceiver on the NXP Command Module. The output of the CAN transceiver (CANH and CANL) is routed down the back plane to the Comms Module and output on a standard 9 way D connector.
Position 2-3 allows this pin to be used as a second I2C channel, I2C_GEN0.

P0[1]/TD1/RXD3/SCL1

JP420 (2-1)	CAN0_RX
JP420 (2-4) (Default)	CAN0_RX_LOCAL
JP420 (2-3)	I2C_GEN0_SCL

Position 2-1 routes the CAN logic level receive traffic from the backplane to the I/O pin. The traffic usually comes from the physical layer CAN transceiver present on the Communications Module. It is possible on the Comms Module to have an isolated CAN stream.
Position 2-4 routes the CAN logic level receive traffic from the local physical layer CAN transceiver on the NXP Command Module.
Position 2-3 allows this pin to be used as a second I2C channel, I2C_GEN0.

P0[2]/TXD0/AD0[7]

JP439 (2-1) (Default)	ASC0_TX_TTL
JP439 (2-4)	AN7
JP439 (2-3)	AN15

Position 2-1 is the main RS232/UART channel. Outgoing logic level transmit traffic is routed to the Communication Module where it is translated into RS232/RS485 logic levels.

P0[3]/RXD0/AD0[6]

JP440 (2-1) (Default)	ASC0_RX_TTL
JP440 (2-4)	AN6
JP440 (2-3)	AN14

Position 2-1 is the main RS232/UART channel. Incoming logic level receive traffic is routed from the Communication Module.

P0[4]/I2SRX_CLK/RD2/CAP2[0]

JP438 (2-3)	GPIO7_I2S_RX_CLK
JP438 (2-1) (Default)	EVM0_GPIO21

P0[5]/I2SRX_WS/TD2/CAP2[1]

JP437 (2-3)	GPIO9_I2S_RX_WS
JP437 (2-1) (Default)	EVM1_GPIO23
JP437 (2-4)	CPU_DACO0_GPIO17

P0[10]/TXD2/SDA2/MAT3[0]

JP421 (2-1) (Default)	GPIO0
JP421 (2-3)	EVG6_GPIO52

P0[11]/RXD2/SCL2/MAT3[1]

JP422 (2-1) (Default)	GPIO1
JP422 (2-3)	EVG7_GPIO54

P0[19]/DSR1/SDA1

JP436 (2-3)	GPIO10_MCI_CLK
JP436 (2-1) (Default)	EVM2_GPIO41_CAPADC

P0[20]/DTR1/SCL1

JP435 (2-3)	GPIO12_MCI_CMD
JP435 (2-1) (Default)	EVM3_GPIO43

P0[21]/RI1/RD1

JP434 (2-3)	GPIO14_MCI_PWR
JP434 (2-1) (Default)	EVM4_GPIO45

P0[22]/RTS1/TD1

JP433 (2-3)	GPIO2_MCI_DAT0
JP433 (2-1) (Default)	EVM6_GPIO49

P0[23]/AD0[0]/I2SRX_CLK/CAP3[0]

JP403 (2-1) (Default)	AN0
JP403 (2-3)	AN8

P0[24]/AD0[1]/I2SRX_WS/CAP3[1]

JP402 (2-1) (Default)	AN1
JP402 (2-3)	AN9

P0[25]/AD0[2]/I2SRX_SDA/TXD3

JP401 (2-1) (Default)	AN2
JP401 (2-3)	AN10

P0[26]/AD0[3]/AOUT/RXD3

JP408 (2-1) (Default)	AN3
JP408 (2-4)	AN11
JP408 (2-3)	CPU_DACO0_GPIO17

Port P1 Options

P1[18]/USB_UP_LED/PWM1[1]/CAP1[0]

JP407 (2-1) (Default)	EVG5_GPIO50
JP407 (2-3)	EVG8_GPIO56
JP407 (2-4)	EVG0_GPIO40

P1[19]/MC0A/USB_PPWR/CAP1[1]

JP409 (2-1)	MOTORP0H
JP409 (2-3) (Default)	EVG9_GPIO57

P1[20]/MCFB0/PWM1[2]/SCK0

JP410 (2-1)	MOTORH0_ENC0
JP410 (2-3) (Default)	EVG10_GPIO58

P1[21]/MCABORT/PWM1[3]/SSEL0

JP411 (2-1)	EMG_TRAP
JP411 (2-3) (Default)	EVG11_GPIO59

P1[22]/MC0B/USB_PWRD/MAT1[0]

JP412 (2-1)	MOTORP0L
JP412 (2-3) (Default)	EVG12_GPIO60

P1[23]/MCFB1/PWM1[4]/MISO0

JP413 (2-1)	MOTORH1_ENC1
JP413 (2-3) (Default)	EVG13_GPIO61

P1[24]/MCFB2/PWM1[5]/MOSI0

JP414 (2-1)	MOTORH2_ENC2
JP414 (2-3) (Default)	EVG14_GPIO62

P1[25]/MC1A/MAT1[1]

JP415 (2-1)	MOTORP1H
JP415 (2-3) (Default)	EVG15_GPIO63

P1[26]/MC1B/PWM1[6]/CAP0[0]

JP416 (2-1)	MOTORP1L
JP416 (2-3) (Default)	EVG16_GPIO64

P1[28]/MC2A/PCAP1[0]/MAT0[0]

JP417 (2-1)	MOTORP2H
JP417 (2-3) (Default)	EVG17_GPIO65

P1[29]/MC2B/PCAP1[1]/MAT0[1]

JP418 (2-1)	MOTORP2L
JP418 (2-3) (Default)	EVG18_GPIO66

P1[30]/Vbus/AD0[4]

JP405 (2-1) (Default)	AN4
JP405 (2-3)	AN12

P1[31]/SCK1/AD0[5]

JP404 (2-1) (Default)	AN5
JP404 (2-3)	AN13

Port P2 Options

P2[0]/PWM1[1]/TXD1

JP432 (2-3)	ASC1_TX_TTL
JP432 (2-1) (Default)	EVM7_GPIO51

P2[1]/PWM1[2]/RXD1

JP431 (2-3)	ASC1_RX_TTL
JP431 (2-1) (Default)	EVM8_GPIO53

P2[3]/PWM1[4]/DCD1/TRACEDATA[2]

JP430 (2-3)	CPU_DACO0_GPIO17
JP430 (2-1) (Default)	EVG2_GPIO44

P2[4]/PWM1[5]/DSR1/TRACEDATA[1]

JP429 (2-3)	CPU_DAC01_GPIO19
JP429 (2-1) (Default)	EVG3_GPIO46

P2[5]/PWM1[6]/DTR1/TRACEDATA[0]

JP428 (2-1) (Default)	EVG4_GPIO48
JP428 (2-3)	EVG19_GPIO67

P2[6]/PCAP1[0]/RI1/TRACECLK

JP427 (2-1)	MOTOR_TCO_FB
JP427 (2-3) (Default)	User LED0

P2[7]/RD2/RTS1

JP426 (2-1) (Default)	ASC1_TX_TTL_ASC0_DTR
JP426 (2-3)	CAN1_RX

P2[8]/TD2/TXD2

JP425 (2-1) (Default)	ASC1_TX_TTL
JP425 (2-3)	CAN1_TX

P2[9]/USB_CONNECT/RXD2

JP424 (2-1) (Default)	ASC1_RX_TTL
JP424 (2-3)	EVM10_GPIO68_ASCO_CTS

P2[10]/#EINT0/NMI

JP423 (2-1) (Default)	IRQ_GPIO16_CNTRL_I2C_INT
JP423 (2-3)	IRQ_GPIO18_I2C_GEN0_INT

Port P3 Options

P3[25]/MAT0[0]/PWM1[2]

JP406 (2-1)	EVG0_GPIO40

JP406 (2-3) (Default)	User LED1

Selecting JP406 position 2-3 allows use of the on board user led LED1 (D401)

4. Zero Ohm Links

CAN Load Resistor

JP501	This link when inserted includes a 120 ohm resistor across CANH0 and CANL0. The default is connected.

AN_REF

R101	This zero ohm link when inserted provides a 3.3V reference for the EDP platform. The 3.3V used is the local supply voltage derived from a local voltage regulator. This link should be used in the absence of a 3.3V voltage reference voltage provided by the Analogue Module when fitted. The default position is not connected.

AGND & VAGND

R102	This link when inserted provides a way of connecting the VAGND to the SGND. This is the default position. The two grounds alternatively can be connected to each other on the analogue module.

5. Software Support

The NXP Command Module for the RS-EDP platform is supported by all of the necessary software drivers to make driving of the platform very easy. All the low level support for the devices controlled by I2C for example have been written, as well as a test menu to exercise each of the modules independently of the others. This therefore provides working example of the code which will allow students and users to cut and paste various sections into their own applications.

Each Applications Module has its own header file which provides the support for the functions that control it. Each module has its own set of high level functions that can be called to operate and control the hardware. This makes life a lot easier for the user, who can then spend most of his time working at the higher level application layer.

The software has been packed up as several ZIP file which can be downloaded and unpacked. Most of the projects have been written for the Keil uVision environment.

The majority of the applications written use the serial comm. channel ASC0 for outputting data to a terminal emulator. With this in mind a serial terminal emulation program should be used to read traffic outputted from the RS-EDP platform. Hyper Terminal is included in windows as part of the Windows Operating system but this does not work reliability. With this in mind it may be worth looking at other terminal emulator especially if they are to be used with USB-RS232 converters.

The terminal emulator should be set up for

115,200 baud
8 data bits
no stop bit
no parity
No flow control

The default jumper options for JP439 and JP430 should be left in place to ensure serial traffic is routed to the communication module. Always check the software to see if the baud rate has been changed.

Some of the provided software includes...

5.1 RSEDP_Test_Suite

This software exercises the NXP LPC1768 MCU peripherals including the on board ADC, PWM output, input capture, I2C, CAN, and I/O. The software also allows you to exercise the basic Application Modules, which are the Communication Module, the Digital I/O Module, and the Analogue Module. A suite of drivers and test menus are provided to fully exercise all the hardware on these boards.

5.2 MC1_Test_Suite

This is similar to the RSEDP_Test_Suite, but the test menus provided are for the MC1 Brushed DC Motor Drive Application Module. The motors are nominally 12V brushed DC motors running in a full H bridge configuration. The test suite allows you to accelerate the motor, change its direction, turn the brake on and off, as well as allowing the monitoring of motor current, DC link voltage and tacho feedback signals. The MC1 motor drive module also has many external inputs for limit switch detection and conditioning of motor related stimuli. The provided software library will therefore allow you to fully exercise your motor.

5.3 MC2_Test_Suite

This is similar to the MC1 test suite but for brushless DC/AC motors. The software assumes you have an MC2 motor drive module fitted, and you want to communicate to it via I2C packets. This set of software therefore allows you communicate with the MC2 motor drive module across the I2C backplane network, present in the RSEDP system. You can have up to three MC2 motor drives fitted and this suite of software allows you to communicate with all of them.

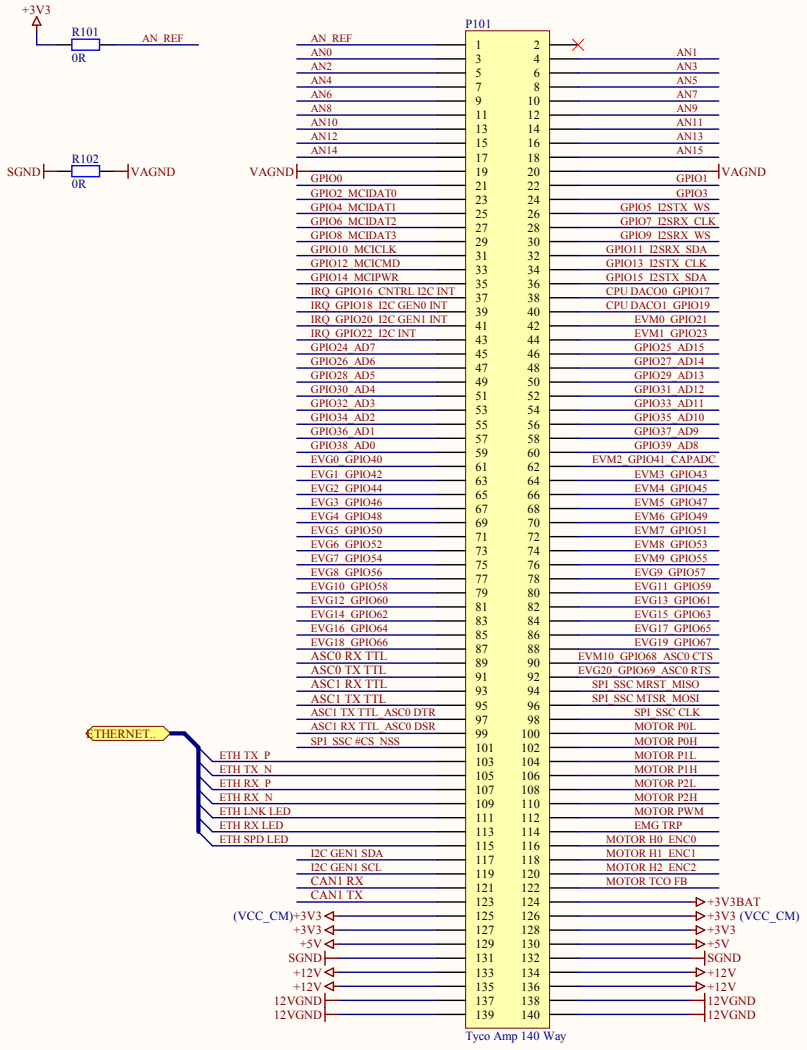
5.4 Easy Web

This piece of software allows the NXP processor to serve a web page via its on board Ethernet port. The software allows you to effectively test the Ethernet port is working correctly. The software was written by Andreas Dannenberg at the University of Applied Science in Germany, and has been modified to work on the RSEDP platform.

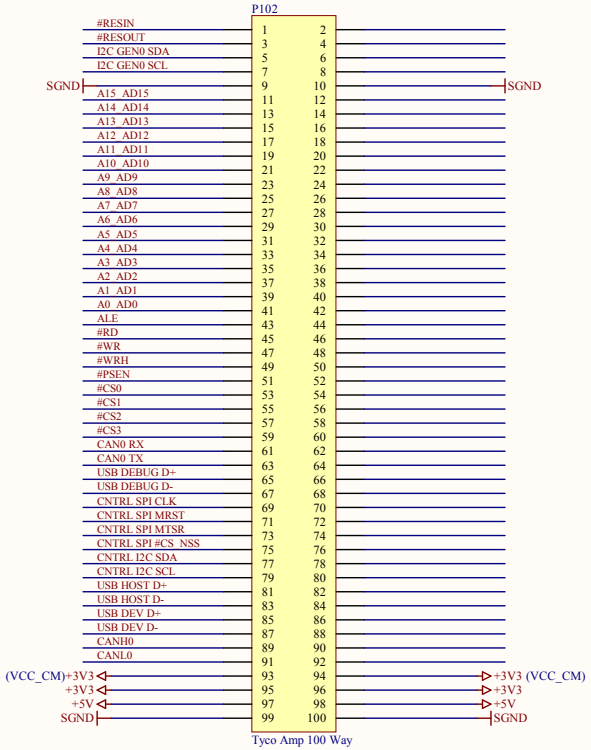
By using these suites of software you can fully exercise the RS-EDP platform to ensure all of the items are working correctly. You can also use the software as building blocks for your own projects.

Module Position 1

EDPCON1 IO Connector



EDPCON2 Bus/Control Connector



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Approved By:	Size: A3	Number: EDP-CM-LPCx	Revision: B
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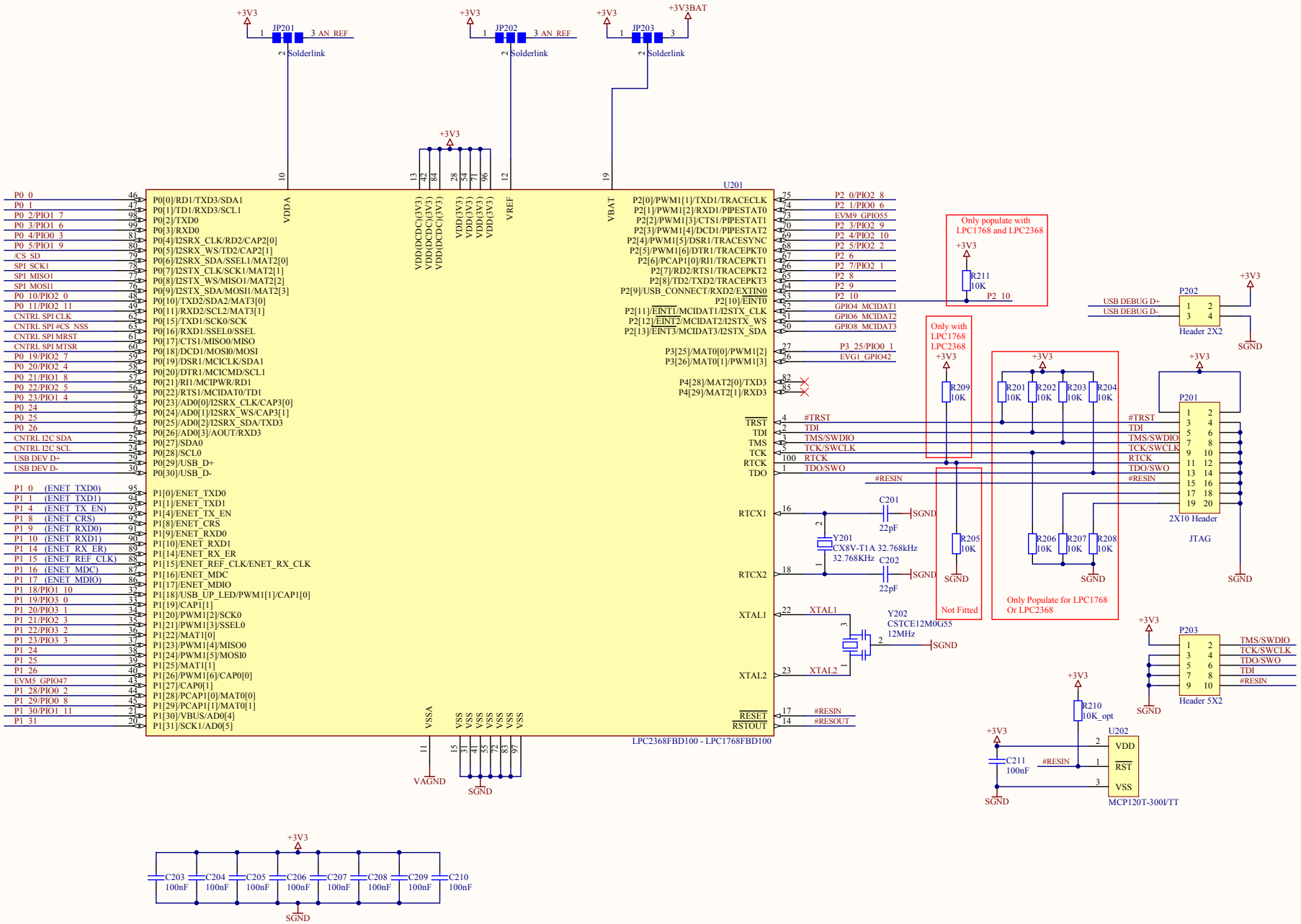

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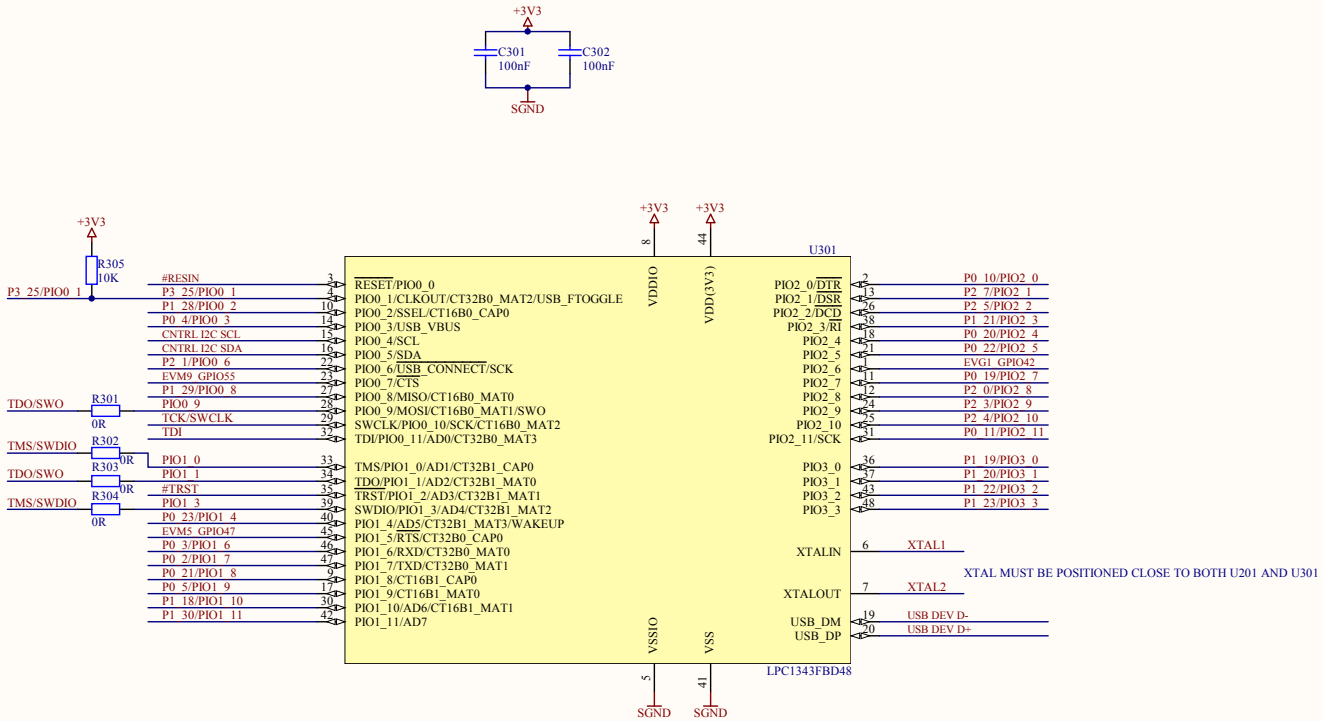

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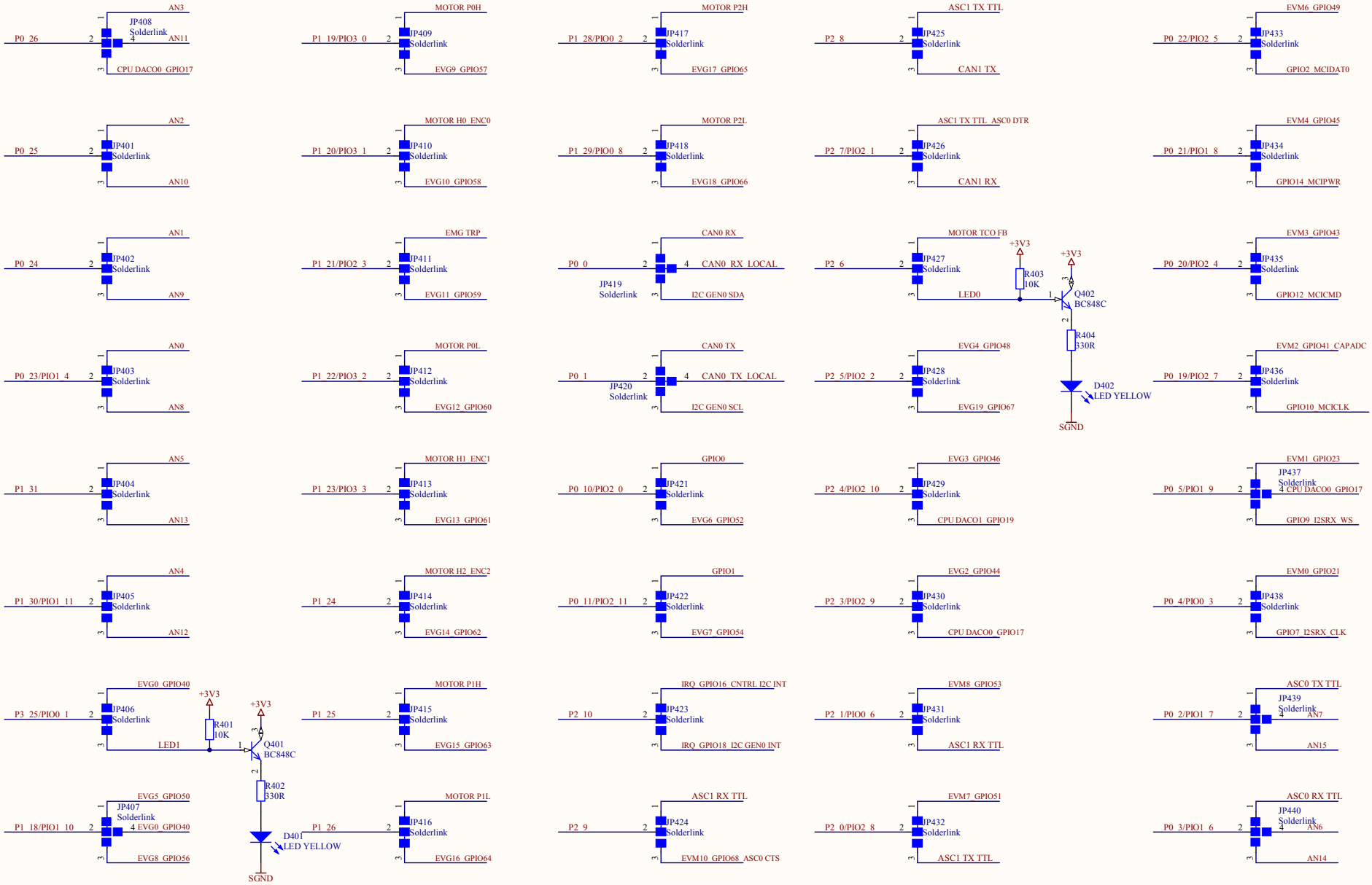

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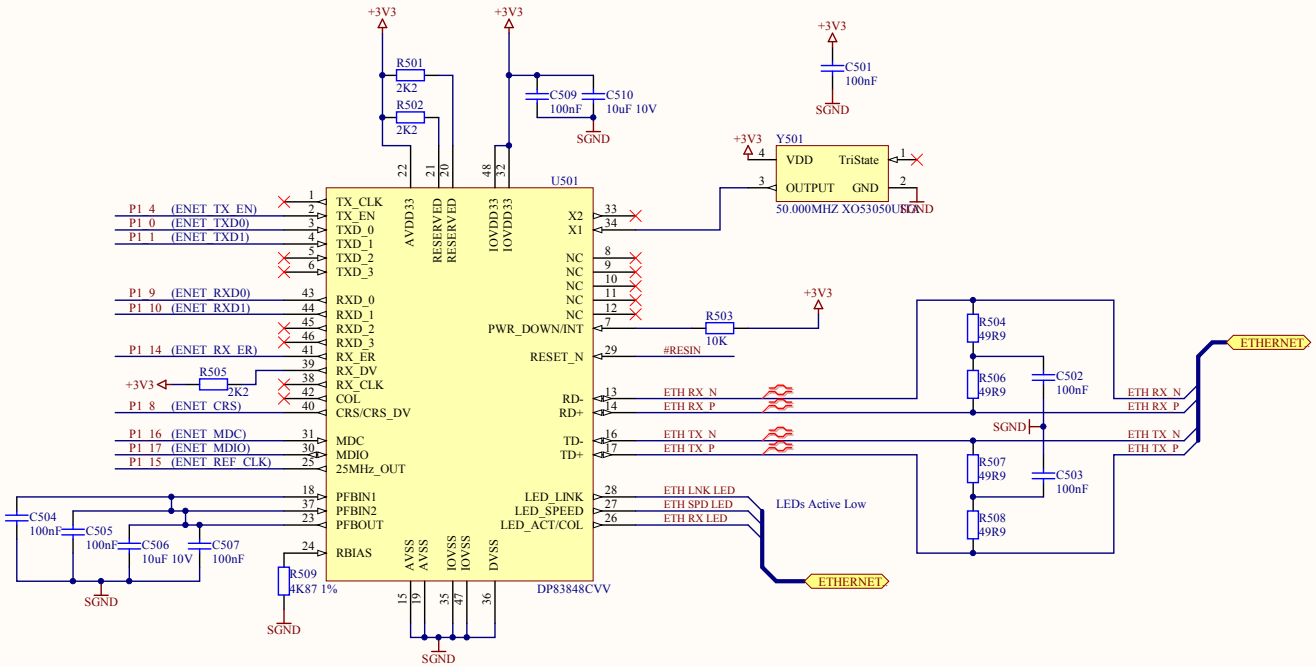
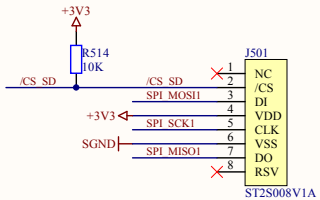
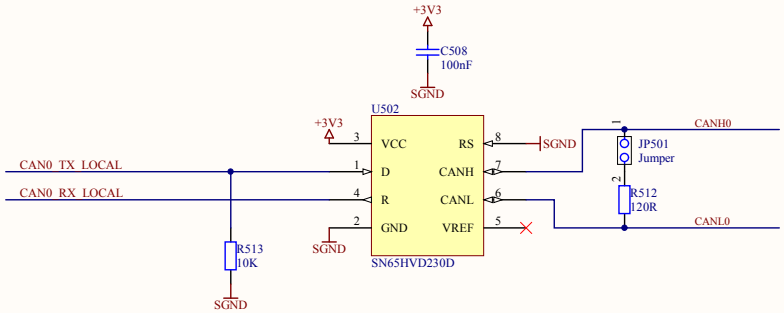
hitex DEVELOPMENT TOOLS







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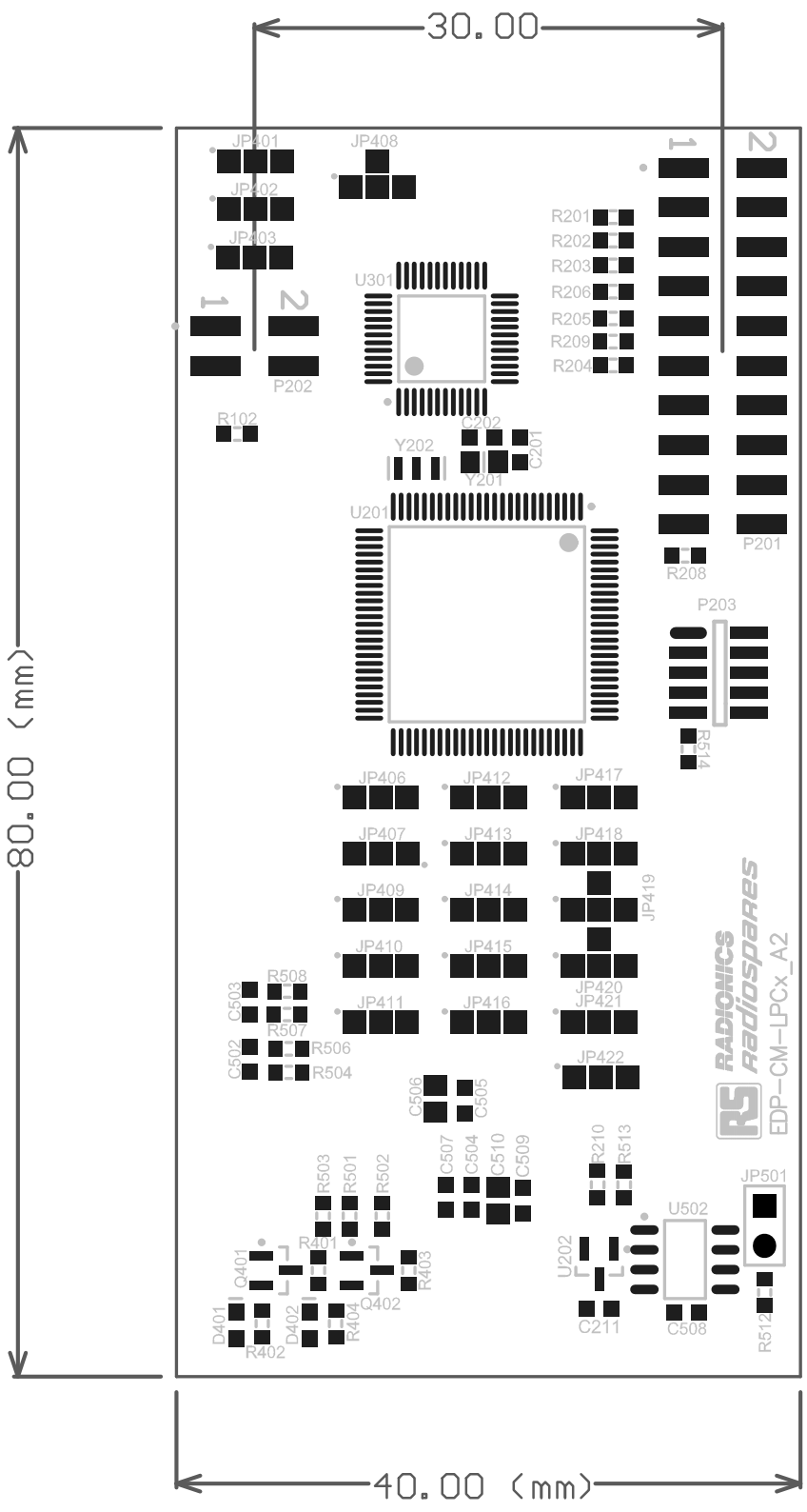
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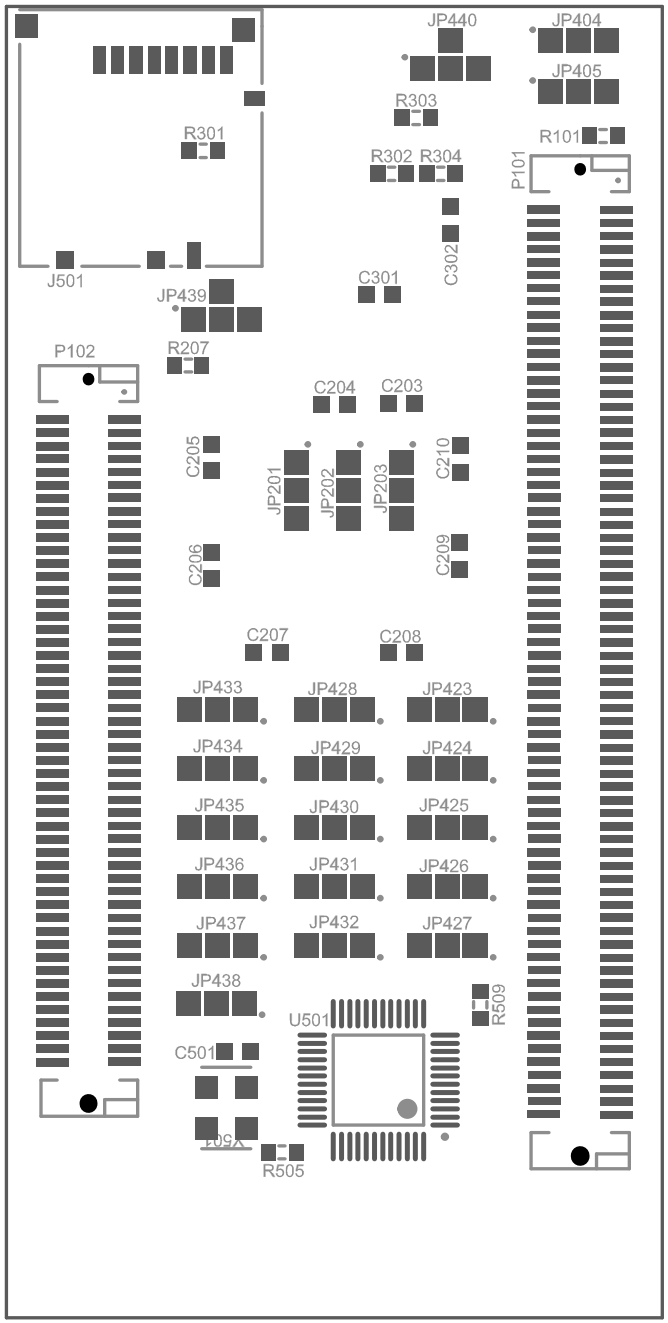
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C501
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